AT&T

Suite 1000
1120 20th Street, N.W.
Washington, DC 20036
202 457-3810

EX PARTE OR LATE FILED

February 7, 1997

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M. St., NW, Room 222
Washington, D.C. 20554

RECEIVED
FEB 7 1997
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

RE: Ex Parte Presentation – Proxy Cost Models
CC Docket No. 96-45

Dear Mr. Caton,

AT&T and MCI are pleased to submit Release 3.0 of the Hatfield Model for the Federal-State Joint Board's consideration in CC Docket No. 96-45. This new release of the Hatfield Model addresses all of the issues raised in Appendix F of the Joint Board's Universal Service Order, as well as issues that were raised at the workshops on cost proxy models held by the Joint Board staff on January 14 and 15.

Today's filing includes a CD-ROM of the model, including its input data for California, Colorado, New Jersey, Texas and Washington. The Hatfield sponsors expect to file an updated CD-ROM including the input data for all states shortly. Included as paper attachments to today's filing are complete documentation of the model and its user-adjustable inputs, as well as example output runs from certain LECs in each of the five filed states.[1]

Presentations of these materials were made in meetings today with Robert Loube, Brian Clopton, Emily Hoffnar, William Sharkey and Leo Bridge. Representing AT&T were myself, Michael Lieberman and Seth Schuler. Chris Frentrup represented MCI.

[1] Due to an error in file naming, the Model's documentation file on the CD-ROM is titled: HM_DOC_MODEL_DESCRIPTION.xls. This file is actually a Word for Windows file and should be opened through Word for Windows, and not through Excel.

Two copies of this Notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules. Copies of the CD-ROM are being filed with the Secretary and with ITS.

Sincerely,

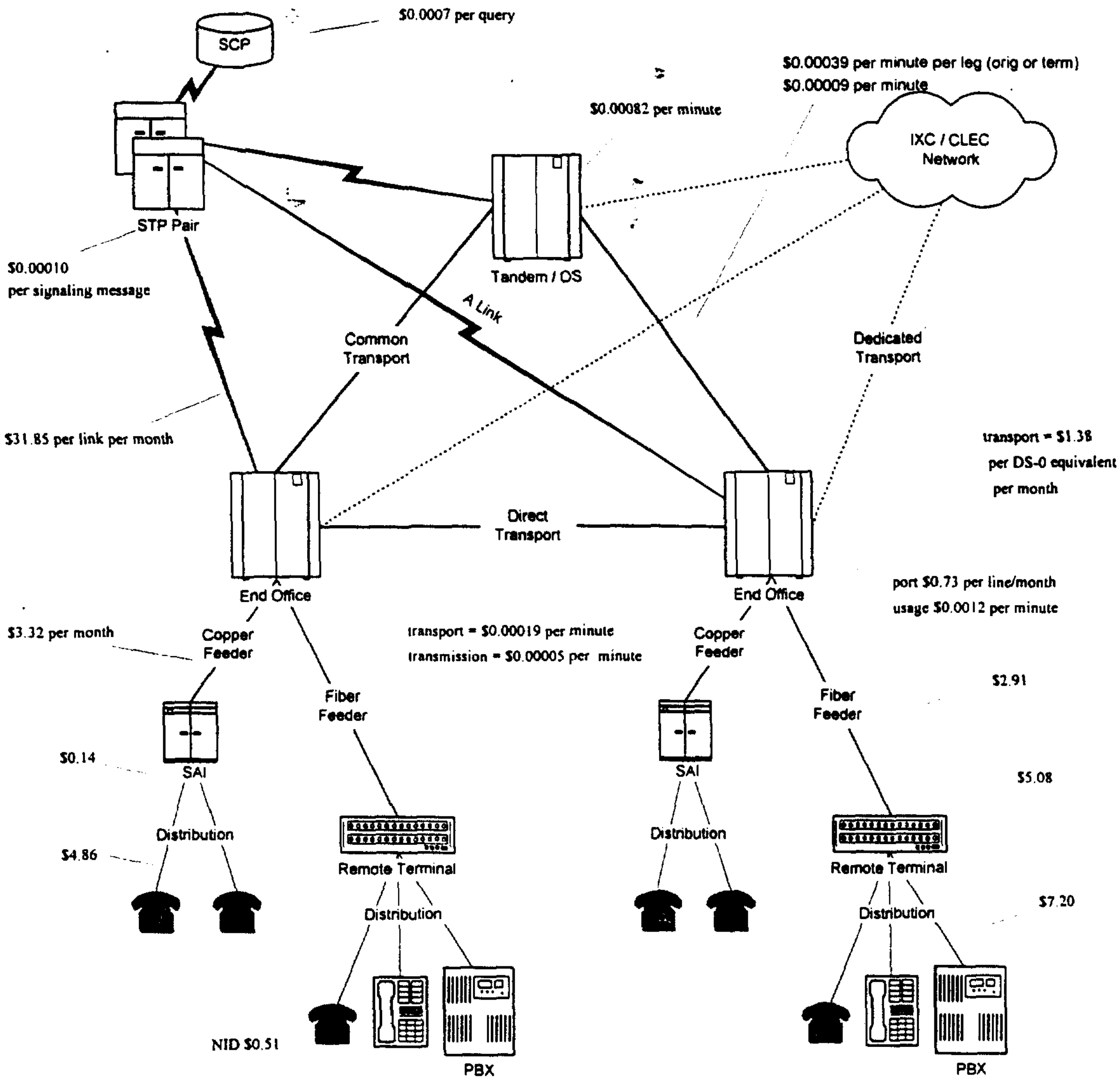
Richard N. Clarke

Richard N. Clarke

Attachments

cc:	Robert Loube	w/o atts
	Brian Clopton	w/o atts
	Emily Hoffnar	w/o atts
	William Sharkey	w/o atts
	Leo Bridge	w/o atts

Unbundled Elements ***Access/Interconnection*** ***Universal Service***



HATFIELD MODEL, RELEASE 3.0

February 7, 1996

INDEX

Tab 1	Hatfield Model Release 3.0 Model Description
Tab 2	Appendix A - Data Inputs Development Description
Tab 3	Appendix B - Inputs and Assumptions
Tab 4	Automation Description and User Guide
Tab 5	State Runs - Texas
Tab 6	State Runs - California
Tab 7	State Runs - Colorado
Tab 8	State Runs - New Jersey
Tab 9	State Runs - Washington
Tab 10	Single Line Business Count

TAB 1

Hatfield Model Release 3.0

Model Description

Model Description

Hatfield Model

Release 3.0

Hatfield Associates, Inc.

737 29th Street, Suite 200
Boulder, Colorado 80303

February 7, 1997

TABLE OF CONTENTS

I. INTRODUCTION 3

A. OVERVIEW 3

B. EVOLUTION OF THE HATFIELD MODEL 5

II. A SUMMARY OF CHANGES BETWEEN HM2.2.2 AND HM R3 7

III. STRUCTURE OF THE MODEL 11

A. GENERAL NETWORK COMPONENTS 11
1. Loop description 11
a) General loop description 12
b) Local Loop Components 12
(1) Network Interface Device (NID) 12
(2) Drop 12
(3) Block Terminal 13
(4) Distribution Cable 13
(5) Feeder facilities 13
2. Switching and Interoffice Network Description 14
a) Wire centers 15
b) End office switches 15
c) Tandem switches 16
d) Interoffice Transmission Facilities 16
e) Signal Transfer Points (STPs) 16
f) Service Switching Points (SSPs) and Signaling Links 17
g) Service Control Points (SCPs) 17

B. OVERVIEW OF MODEL ORGANIZATION 17
1. Work Files 18
2. Distribution Module 19
3. Feeder Module 19
4. Switching and Interoffice Module 19
5. Expense Module 20

IV. MODULE DESCRIPTIONS 20

A. WORK FILES 21
1. Demographic and geological parameters 21
2. Interoffice distances 23
3. ARMIS data reported by the LECs 23
4. User inputs 24

B. COMMON ASPECTS OF THE DISTRIBUTION MODULE AND THE FEEDER MODULE24

1. General Outside Plant Configuration 24
2. Basic Assumptions 24
3. Line Density Considerations 25
4. Outside Plant Structure 25
a. Aerial Structure 26
b. Buried Structure 26
c. Underground Structure 26
5. Terrain and Placement 27
6. Structure Sharing 28

C. DISTRIBUTION MODULE 28
1. Overview 28
2. Distribution Plant Calculations 31
a) Unoccupied Land and Clustering 32
b) Effective Plot Size 32

D. FEEDER MODULE 33
1. Overview 33
2. Feeder Plant Calculations 35
a) Calculating Main Feeder and Sub-Feeder Distances 36
b1) Sizing Copper Feeder Facilities 38
b2) Copper and Fiber Sub-Feeder Cable Sizing 39
c) Computing Feeder Component and Structure Investment. 41
d) Allocating a Fraction of Total Main Feeder Investment to CBG 42

E. SWITCHING AND INTEROFFICE MODULE 43
1. Overview 43
2. Description of inputs and assumptions 43
a) Traffic Assumptions 44
b) Explanation of calculations 44
3i. End office switching investment calculations 44
3ii. Transport calculations 47
3iii. Tandem switch calculations 49
3iv. Signaling network calculations 50
3v. Operator systems calculations 51

F. EXPENSE MODULE 51
1. Overview 52
2. Estimation of Capital Carrying Costs 53
3. Operating Expenses 55
a) Network-Related Expenses 56
b) Non-Network-Related Operating Expenses and Expense Factors 57
4. Outputs of the Expense Module 58

IV. SUMMARY 61

APPENDIX A Data Inputs Development Description
APPENDIX B Default Values of User-Adjustable Inputs

I. INTRODUCTION

A. OVERVIEW

The Hatfield Model has been developed by Hatfield Associates, Inc. ("HAI"), of Boulder, Colorado, at the request of AT&T and MCI for the purpose of estimating the forward-looking economic costs of: 1) unbundled network elements ("UNEs"), based on Total Element Long Run Incremental Cost ("TELRIC") principles;[1] 2) basic local telephone service, as defined by Federal State Joint Board for universal service funding purposes; and 3) carrier access or interconnection. All three sets of costs are calculated using a consistent set of assumptions, procedures and input data.

The Hatfield Model calculates the costs of the following UNEs:

- Network Interface Device ("NID")
- Loop Distribution
- Loop Concentrator/Multiplexer
- Loop Feeder
- End Office Switching
- Operator Systems
- Common Transport
- Dedicated Transport
- Direct Transport
- Tandem Switching
- Signaling Links
- Signal Transfer Point ("STP")
- Service Control Point ("SCP")

The Hatfield Model uses the definition of "universal service"

[1] TELRIC is the term used by the Federal Communications Commission to refer to the total service long run incremental cost (TSLRIC) of unbundled network elements.

recommended by the Federal-State Joint Board on Universal Service.[2] The recommendation states that the following functional components be considered as universal service:

- single-line, single-party access to the first point of switching in a local exchange network;
- usage within a local exchange area, including access to interexchange service;
- touch tone capability;
- a white pages directory listing; and
- access to 911 services, operator services, directory assistance, and telecommunications relay service for the hearing-impaired.

Excluded from this definition of universal service are many other local telephone company services, such as toll calling, custom calling and CLASS[SM] features, and private line services, although the existence of such services is taken into account in developing the cost estimates for unbundled elements. Model users also may dynamically control the amounts of these elements used in calculating support requirements.

The model constructs a "bottom up" estimate of the pertinent costs based upon detailed information concerning customer demand, network component prices, operational costs, network operations criteria, and other factors affecting the costs of providing local service. The model, for example, receives as input data service demand, as measured by customer locations and traffic volumes, within the serving area of the company being studied. From these data, it builds an engineering model of a local exchange network with sufficient capacity to meet the total service demand, and to maintain a high level of service quality. The prices of various network components, with their associated installation and placement costs, along with various capital cost parameters are also used as inputs. These data are used to populate detailed input tables displaying, for example, the cost per foot of various sizes of copper and fiber cable, cost per line of switching, cost of debt, or depreciation lives for each specific network component.. Using these data, the model calculates the required network investments by detailed plant category. The Model then converts this investment into an annual capital carrying cost. Operations expenses are then added to the capital carrying cost to compute the monthly cost of universal service, carrier access and interconnection, and various unbundled network elements.

This document describes Release 3.0 of the Hatfield Model . It discusses

[2] Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Recommended Decision, November 8, 1996, ("Recommended Decision") Paragraph 45-53, 65-70.

both the structure and operation of the Hatfield Model, Release 3.0 (HM3), and specific inputs to the model. Subsection B of this section describes the evolution of the Hatfield Model. Section II provides a synopsis of changes made to the model between the prior version, HM 2.2.2,[3] and this version. Section III describes each module and its operation in detail. Section IV summarizes the document.

Appendix A.documents the data input development for demographic and geological coding, wire center mappings, business line counts, wire center distance calculations and percent of CBG area that is empty. Appendix B identifies the user inputs to the model, and their default values..

B. EVOLUTION OF THE HATFIELD MODEL

The Hatfield Model was originally developed to produce estimates of the TSLRIC of basic local telephone service as part of an examination of the cost of universal service. This original model was a "greenfield" model in that it assumed all network facilities would be built without consideration given to the location of existing wire centers or transmission routes. When the original Benchmark Cost Model (BCM1)[4] became available, HAI revised the original Hatfield Model to incorporate certain loop investment data produced by BCM1. As a result, the Hatfield Model adopted the BCM1's "scorched node" methodology, in which efficient, forward-looking network investments and costs for basic universal service were developed using existing wire center locations. The outputs from the BCM1 loop modeling process were then combined with extensive wire center and interoffice calculations retained from the earlier Hatfield Model to develop complete TSLRIC estimates.

An expanded version of earlier Hatfield Models, referred to as the Hatfield Model, Version 2.2, Release 1, was developed early in 1996 to estimate the costs of unbundled network elements. It was submitted to the Federal Communications Commission (FCC) in CC Docket No. 96-98 on May 16 and 30, 1996, accompanied by descriptive documentation.[5] On July 3, 1996, that model was

[3] The prior practice of identifying the model version using a three-digit notation is no longer utilized.

4 The Benchmark Cost Model is a model of basic local telephone service developed by MCI, NYNEX, Sprint, and U S WEST.

[5] See, Appendix E of the *Comments* of AT&T in CC Docket No. 96-98, In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, and Appendix D of AT&T's *Reply Comments*. In the same proceeding, MCI submitted results based on an earlier "greenfield" version of the Model as Attachment 1 to its *Comments*.

also placed into the record of CC Docket No. 96-45 to assist the Commission in determining the economic costs of universal service.[6]

Further enhancements to this model were released as Hatfield Model, Version 2.2, Release 2 (hereafter HM2.2.2). This version of the model estimated the efficient, forward-looking economic cost of both unbundled network elements and basic local telephone service. HM2.2.2 derived certain of its inputs and methods from the BCM-PLUS model, a derivative of BCM1 that was developed for, and copyrighted by, MCI Telecommunications Corporation.[7]

On August 8, 1996, the FCC released its First Report and Order in CC Docket No. 96-98, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, and CC Docket No. 95-185, Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers (hereafter, the "Order"). The Order provided a comprehensive set of criteria for the arrangements through which the incumbent Local Exchange Carriers (ILECs) would offer unbundled network elements to potential competitive local exchange carriers (CLECs). The criteria included a definition of a cost-based methodology that should be used in setting the price of unbundled network elements. The methodology was termed the Total Element Long Run Incremental Cost, or TELRIC. The methodology of the Hatfield Model is fully consistent with the TELRIC principles set forth in the Order.

AT&T and MCI have used HM2.2.2 as the basis for their recommended prices for unbundled network elements in a large number of state jursidictions. As a result, the model has already been examined in arbitration proceedings by the ILECs, state commission staffs, and other parties. Its results have also been adopted in several of these proceedings. Release 3 incorporates several enhancements that have been suggested in the course of these proceedings.

The Hatfield Model, Release 3.0 also incorporates modifications and enhancements based on the comments and recommendations of the Federal-State Joint Board on Universal Service. On November 8, 1996, this body issued its Recommended Decision in CC Docket No. 96-45.[8] In addition to defining Universal Service, the Board also addressed the issue of determining the level of

[6] See FCC Public Notice, DA-96-1078, Released July 3, 1996 and DA 1094, Released July 10, 1996 ("Cost Model Public Notice").

[7] On July 3, 1996, Sprint Corporation and U S WEST presented version 2 of the BCM (called BCM2) to the FCC. NYNEX and MCI are not sponsors of BCM2. A careful review by HAI indicated that all of BCM2's relevant enhancements over BCM1 were already present in the HM 2.2.2. Furthermore, the HM 2.2.2 has important attributes and capabilities that are not available in the BCM2.

[8] Op. Cit., Recommended Decision.

support required for universal service. In doing so, it found that:

> . . . a properly crafted proxy model can be used to calculate the forward-looking economic costs for specific geographic areas, and be used as the cost input in determining the level of support a carrier may need to serve a high cost area. The Joint Board therefore recommends that the Commission continue to work with the state commissions to develop an adequate proxy model that can be used to determine the cost of providing supported services in a particular geographic area . . .[9]

An in depth review of these issues was also provided in the Competitive Pricing Division Staff Analysis of "The Use of Computer Models for Estimating Forward-Looking Economic Costs."[10] Further suggestions for the improvement of proxy models were advanced at workshops conducted by the Federal-State Joint Board on January 14 and 15 of this year. Although the Board has declined to recommend any particular proxy model, it has provided an extensive review of the existing models, and established a number of criteria such models should meet.[11]

HM R3.0 is the product of all the foregoing activities and analyses. It provides additional enhancements to HM 2.2.2 based on the reviews and suggestions to which it has been subject during the arbitration proceedings on unbundled network elements. It also addresses the concerns raised by the Joint Board in its consideration of proxy cost models and the FCC in its consideration of modeling the forward looking economic cost of interconnection. It is intended to be responsive to the principles established, and concerns raised about existing models, in the interconnection Order, the Joint Board Recommendation and in Staff Papers and Workshops.

II. A SUMMARY OF CHANGES BETWEEN HM2.2.2 AND HM R3

A number of significant changes have been made to HM 2.2.2 in arriving at HM R3.0. These changes are reflected in the discussion of how the new version operates, presented in Section III. The changes can be summarized as follows:

[9] Ibid., paragraph 268.

[10] Released January, 9, 1997.

[11] Ibid., paragraphs 273-277 and Appendix F.

- Results can now be displayed by wire center and/or density zone.

- Additional density zones are now considered. The highest density zone defined in HM2.2.2, greater than 2500 lines per square mile, has been split into three new zones: 2,550 - 5,000; 5,001 - 10,000, and more than 10,000 lines per square mile. This better differentiates between dense downtown and suburban areas. The second lowest density zone in HM 2.2.2, 5-200 lines per square mile, is also subdivided into two zones: 5-100 and 101-200 lines per square mile, thereby providing a finer-grained distinction in low-density areas.

- Each of the nine line density zones is again split into two groups of CBGs. The first consists of all CBGs sufficiently close to the wire center to use copper feeder. The second consists of CBGs sufficiently distant from the wire center to require Digital Loop Carrier (DLC) and fiber feeder. Thus, HMR3.0 incorporates 18 zones for display of pertinent outputs.

- Each Census Block Group (CBG) is now assigned to a wire center based on an analysis of NPA/NXXs serving that CBG. In previous versions of the model, CBGs were assigned to the wire center closest to its centroid. The revised method provides a more accurate determination of the existing wire center that actually serves the given population group.

- Methods of estimating of the number of residence and business lines per CBG have been refined. These refinements, for example, now account for differences in the demand for business lines per employee based on characteristics of the industries that employ these workers.

- An improved, more precise, treatment of distribution cable numbers and lengths better comports with the actual population distributions. The new treatment takes account of a variety of demographic situations. These include the presence of high rise residential/business buildings, multi-tenant units in high-density zones, and towns and unpopulated areas in low-density zones.

- The level of cable fill achieved at the Main Distributing Frame (MDF) is reported in a manner that is consistent with the typical LEC definition of cable fills.

- Copper loops in excess of 18,000 feet use a coarser gauge of cable and include load coils as necessary.

- The calculation of drop and Network Interface Device (NID) costs has been refined by adding a drop length component to the drop cost, allowing the drop to be aerial or buried, and specifying NIDs of varying capabilities.

- The switching system cost model is more sophisticated. It treats RBOCs and large independents separately from small independents, and considers switch line card fill.
- The interoffice transport network assumes the use of SONET fiber rings where appropriate, and treats transmission terminal investments in a more detailed manner. IXC entrance facility costs have been included.
- The treatment of structure cost sharing between feeder and interoffice plant has been refined to better reflect available economies.
- Depreciation expense calculations have been changed to reflect the use of mid-year investments and to adjust for net salvage value. Also, land has been removed from the depreciation calculation.
- Investments in buildings, motor vehicles, garage work equipment, and other work equipment have been added to the general support category.
- The costs of certain labor-intensive investments may now be adjusted by the user to reflect regional labor cost differences.
- Miscellaneous modifications incorporated in Release 3 include:
    - adding multiple Serving Area Interfaces in a CBG when the number of lines served is too large for a single SAI;
    - provisioning additional conduit when additional copper feeder cables are required.
    - conduit is no longer shared among utilities, and spare conduit is added to distribution, feeder, and interoffice underground routes.
    - The formats of numerous intermediate and final output reports have been improved.
- A number of component cost inputs have been revised to reflect more accurate information than was available for HM 2.2.2.
- The model will now execute considerably faster, and on a PC with less memory requirements.

As important as these changes are in increasing the accuracy and granularity of the model's results, it is also important to emphasize several aspects of HM2.2.2 that have been maintained in HM3.0. These include:

- Incorporation of economic principles that the Joint Board has identified as appropriate in estimating the cost of universal service;[12] namely
    - consideration of all costs associated with all elements necessary to provide universal service, including all major categories of network components (i.e., loop, switching, transport, signaling), and all detailed components within those categories (e.g., network interface devices, drops, terminals and splices, wire center components in addition to switching, interoffice terminals, etc.);
    - assumption of least cost, most efficient and reasonable technology currently available to LECs,
    - use of existing ILEC wire center locations;
    - consideration of forward-looking costs only, not embedded or sunk costs;
    - use of forward-looking cost of capital, and economic depreciation expenses;
    - estimation of the cost of providing service to all business and households within a geographical area, including first and second residential lines, business lines, public access lines, and special access lines;
    - a reasonable allocation of joint and common costs;
    - availability of all data, computations, and software associated with the model to all parties for review; with the ability to examine and, as appropriate, modify over four hundred inputs;
- The estimation of costs related to a narrowband network capable of supporting univeral service, as defined by the Joint Board, and to narrowband unbundled network elements; and

[12] These are also consistent with the principles set forth in the Commission's Order pertaining to the pricing of unbundled network elements.

- The calculation of the cost of both universal service and unbundled network elements in a single model, using a consistent methodology and a consistent set of inputs.

III. STRUCTURE OF THE MODEL

A. GENERAL NETWORK COMPONENTS

This section describes the network configuration and components modeled in HM R3.0. Figures 1, 2 and 3 depict the relationships among the network components discussed in the following subsections.

1. Loop description

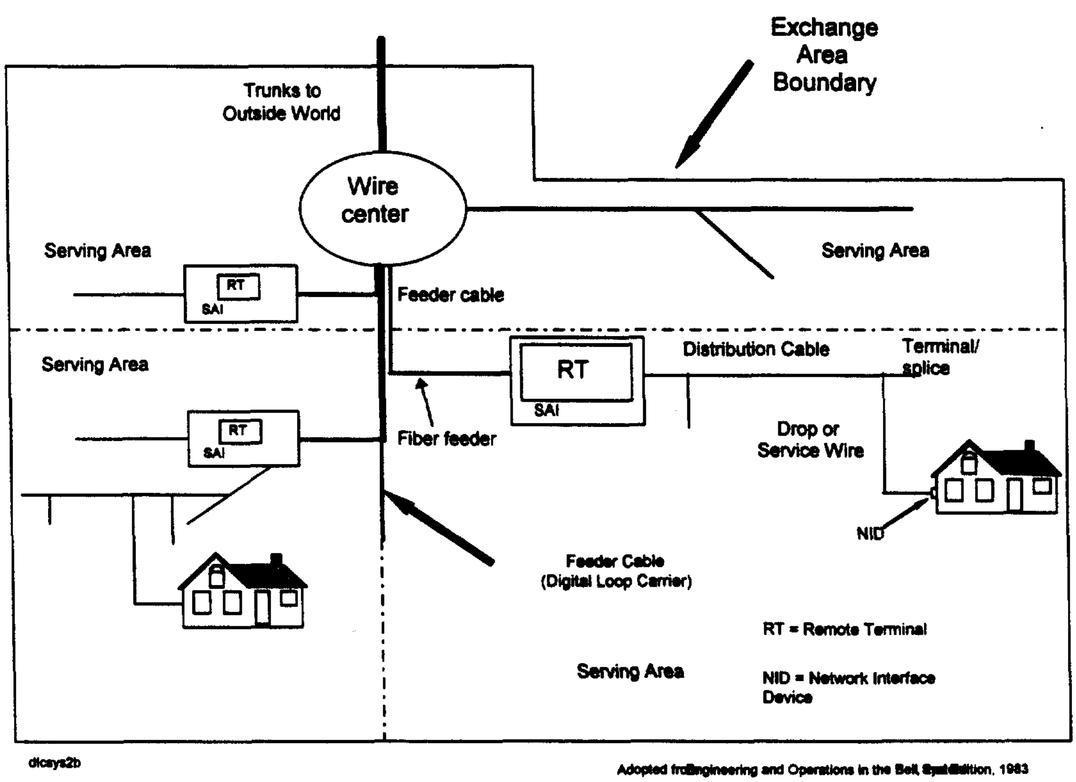


Figure 1 Loop components

a) General loop description

The local loop feeder begins at a physical demarcation frame within the central office building (wire center). Copper cable feeder facilities terminate on the vertical side of the main distributing frame (MDF) in the wire center. Fiber optic feeder cable serving integrated digital loop carrier (DLC) terminates on a fiber distribution frame in the wire center. Copper feeder cable then extends out from the wire center to a serving area interface ("SAI") where it is cross-connected to copper distribution cables. If the feeder is fiber, it extends to a DLC remote terminal at the SAI where optical digital signals are converted to analog signals, and individual circuits are cross-connected to copper distribution cables. At the distant end of these copper distribution cables, the local loop terminates at the Network Interface Device (NID) at the customer's premises.

Loop cables are supported by "structures." These "structures" may be underground conduit, poles, or trenches for buried cable. Underground cable is distinguished from buried cable in that underground cable is placed in conduit, while buried cable comes into direct contact with soil.[13]

b) Local Loop Components

(1) Network Interface Device (NID)

The demarcation point between the local carrier's network and the customer's inside wiring is known as the Network Interface Device (NID). This device terminates the drop wire and is an access point that may be used to isolate trouble between the carrier's network and the customer's premises wiring.

(2) Drop

A copper drop wire extends from the NID at the customer's premises to the block terminal at the distribution cable that runs along the street or the lot line.

[13] While the conduit supporting underground cable is placed in a trench, buried cable may either be placed in a trench or be directly plowed into the earth.

(3) Block Terminal

The interface between the drop and the distribution cable is termed the "block terminal". When aerial distribution cable is used, the block terminal is attached to a pole in the subscriber's backyard or at the edge of a road. If the distribution cable is buried, the block terminal is contained within a pedestal.

(4) Distribution Cable

Distribution cable runs from each of the block terminals to the Serving Area Interface (SAI), also called a "cross box," or a Serving Area Concept (SAC) box or connection. Distribution cable connects the feeder cable with all customer premises within a Census Block Group (CBG). The model assumes that each CBG contains at least one SAI, and that the SAI is placed one-quarter of the way into the CBG for copper feeder, or one-half way for fiber feeder. Distribution structure components may consist of poles, trenches and conduit. Manholes are not used for distribution facilities.

(5) Feeder facilities

Feeder facilities comprise the transmission system that extends from the wire center to the SAIs. These facilities may consist of either pairs of copper wire or a digital loop carrier (DLC) system that uses fiber optic cables as the transmission medium.[14] In a DLC system, the analog signals for multiple individual lines are converted to a digital format and multiplexed into a composite digital bit stream. The Hatfield Model assumes that there is a standard (but user-adjustable) feeder distance beyond which optical feeder cable will be installed and Digital Loop Carrier (DLC) equipment will be used to serve subscribers.

Feeder structure components also include poles, trenches and conduit. Manholes or pullboxes are also normally installed in conjunction with underground feeder cable. Manhole spacing is a function of population density and the type of feeder cable used. Pullboxes installed for underground fiber cable are normally farther apart than manholes used with copper cables -- because the lightness and flexibility of fiber cable permits it to be pulled over longer lengths than copper cable. The costs of structure components normally

[14] Although there are DLC systems that use copper wire for the transmission medium, the model assumes the use of fiber optics transmission, consistent with the use of forward-looking technology. A large majority of DLC systems currently being deployed are fiber optics systems.

are shared among several utilities, e.g., electric utilities, local exchange companies (LECs), interexchange carriers (IXCs) and cable television (CATV) operators.

2. Switching and Interoffice Network Description

This section provides a general description of the network components comprising the wire center and interoffice facilities. Figures 2 and 3 illustrate the relationships among the components described below.

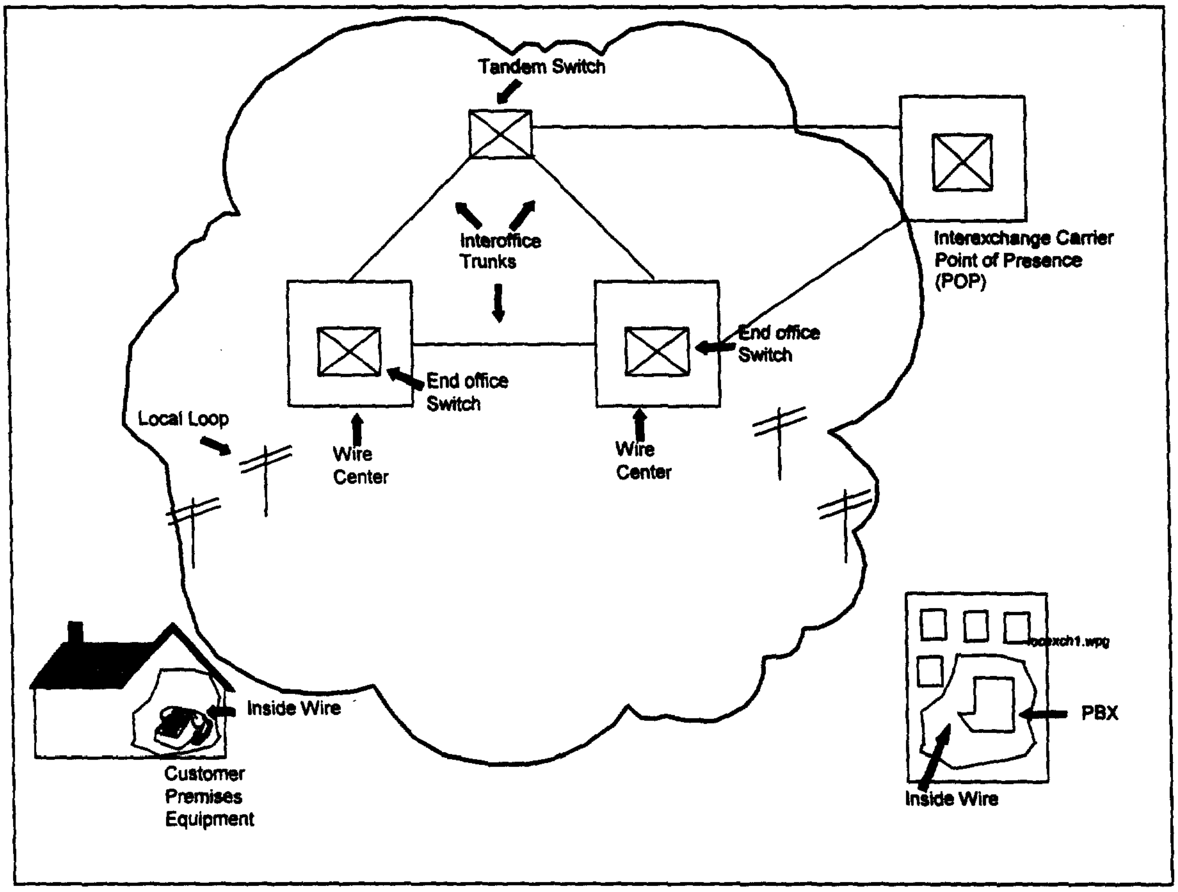


Figure 2 Interoffice network

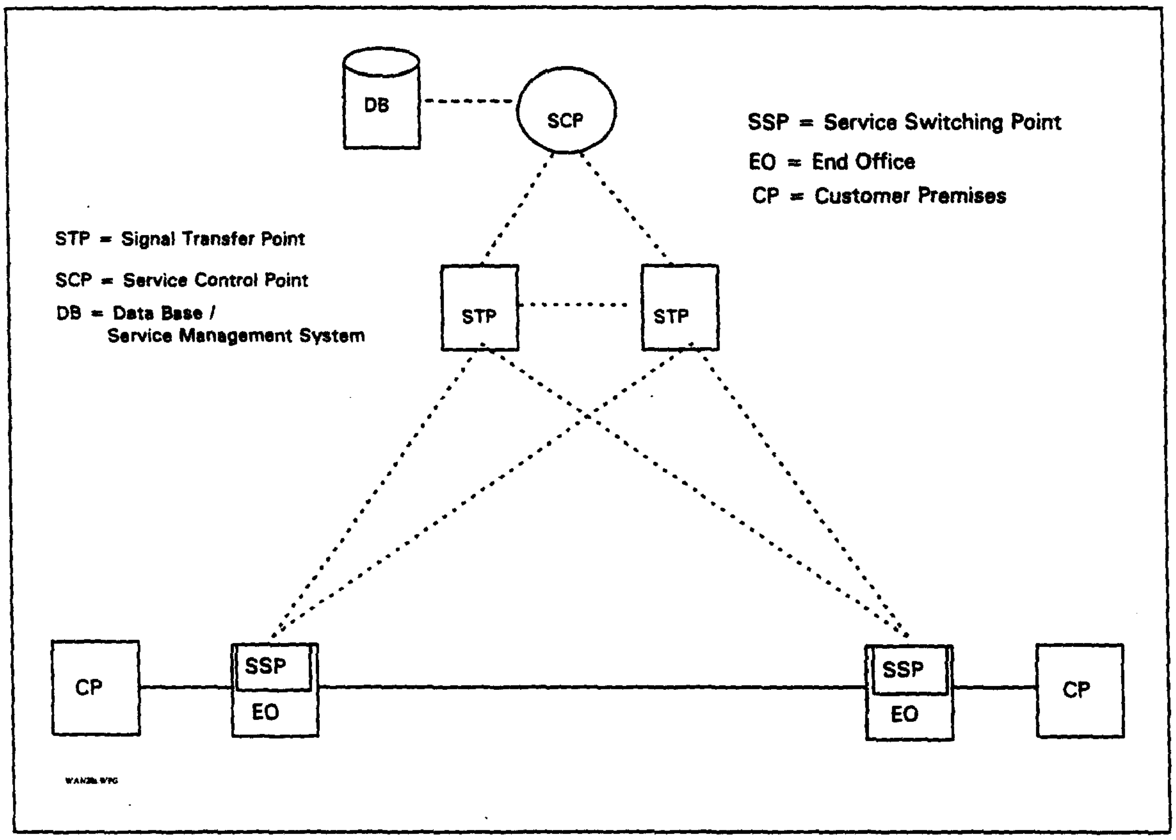


Figure 3 Signaling network components

a) Wire centers

The wire center is a location from which feeder routes emanate towards customer premises. Interoffice circuits or "trunks" emanate towards other wire centers. A wire center normally contains at least one End Office (EO) switch, and may also contain a tandem switch, a Signal Transfer Point (STP), an operator tandem, or any combination of these facilities. Wire center physical facilities include a building, power and air conditioning systems, rooms housing different switches, transmission equipment, distributing frames and entrance vaults for interoffice and loop feeder cables.

b) End office switches

The end office switch provides dial tone to the switched access lines it serves. It also provides on-demand connections to other end offices via direct trunks, to tandem switches via common trunks, to IXC POPs via dedicated trunks, and to operator tandems via operator trunks. The model computes the required number of trunks for each route according to input traffic assumptions and the breakdown of business, residential, and public access lines served by each end office switch.

c) Tandem switches

Tandem switches interconnect end office switches via common trunks and may also provide connections to IXC POPs via dedicated trunks. Common trunks provide an alternate route for traffic between end offices when direct routes are unavailable. Tandem switching functions often are performed by switches that also perform end office functions. At a minimum, they are normally located in wire centers that also house end office switches.

d) Interoffice Transmission Facilities

Interoffice transmission facilities carry the trunks that connect end offices to each other and to tandem switches. The signaling links in a SS7 signaling network are also normally carried over these interoffice facilities.

Consistent with current practice, interoffice transmission facilities are assumed to be fiber optic systems that carry signals in Synchronous Optical Network (SONET) format. Efficient practice also prescribes the use of a fiber optic ring configuration to link switches, except for switches that serve few lines or that are remote from other switches. This provides a redundant path between any two switches and the potential for substantial cost savings relative to more traditional point-to-point facilities.

e) Signal Transfer Points (STPs)

STPs route signaling messages between switching and control entities in a Signaling System 7 (SS7) network via signaling links connecting STPs and SS7-compatible end offices and tandems (called Service Switching Points "SSPs") as well as Service Control Points (SCPs). STPs are equipped in mated pairs, with at least one pair in each LATA.

f) Service Switching Points (SSPs) and Signaling Links

SSPs are SS7-compatible end office or tandem switches. They communicate with each other and with SCPs through signaling links, which are 56 kbps dedicated circuits connecting SSPs with the mated STP pair serving the LATA.

g) Service Control Points (SCPs)

SCPs are databases residing in an SS7 network that contain various types of information, such as IXC identification or routing instructions for 800 numbers in regional 800 databases, or customer line information in Line Information Databases (LIDB).

B. OVERVIEW OF MODEL ORGANIZATION

Figure 4 shows the relationships among the various modules contained within HM R3. An overview of each component module follows.

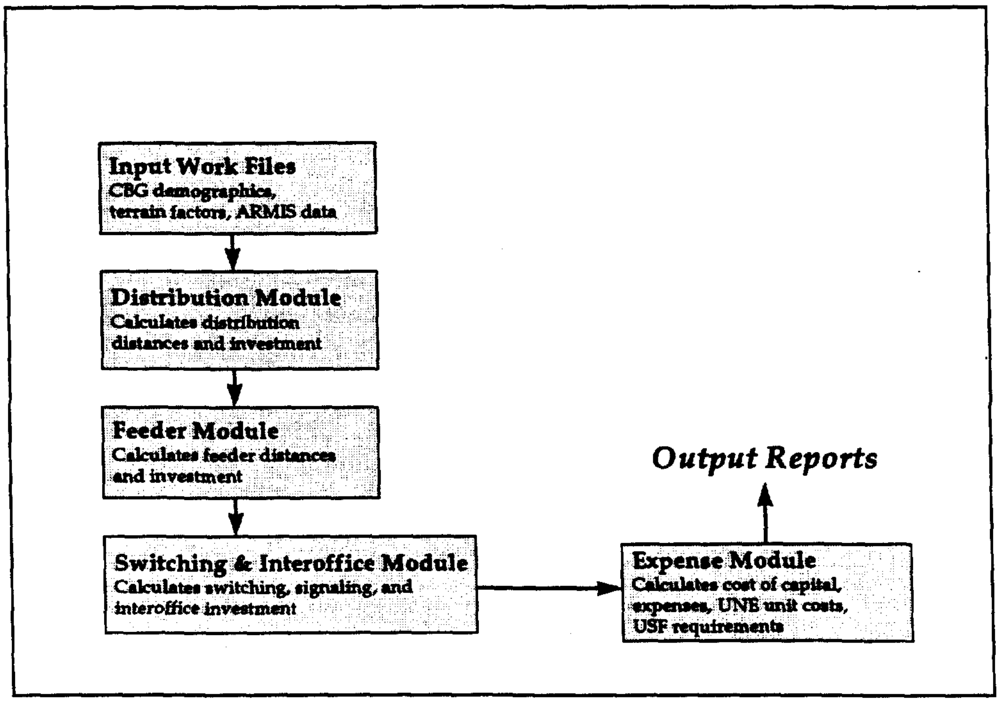


Figure 4 Hatfield Model Organization Flow Chart

1. Work Files

Inputs to HM R3.0 are contained within work files, and are classified as follows:

- Demographic, geographic and geological characteristics of Census Block Groups, used to locate geographically the number of customers requiring telephone service, the wire center that serves them, and the degree of difficulty associated with the installation of outside plant within that CBG.
- Interoffice distances between end offices, tandems, and STPs, used in estimating route miles required for interoffice transmission facilities.
- 1995 ARMIS data reported by the LECs, which provide investment, traffic, and expense information; and
- User-adjustable inputs that allow users to set carrier- or locale-specific parameters, and perform various sensitivity analyses. These inputs have preset default values based on engineering experience and judgment of HAI personnel and selected subject matter experts.